Review Article

# Dental Implants (The Basics): A Brief Review

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## *Abstract*

*The twenty-first century has considered being a peek in the field of dentistry. Implants have proven to be a promising mode of treatment in the rehabilitation of both parts as well as completely edentulous patients. This article aims to provide fundamental knowledge about dental implants systems and discuss various classification systems, indications,*

*contraindications and other clinical aspects of dental implants including the surgical steps.*

***Keywords:*** *Implant, Abutment, Osseointegration.*

## Introduction

The twenty-first century has considered being a peek in the field of dentistry. Implants have proven to be a promising mode of treatment in the rehabilitation of both parts as well as completely edentulous patients. They are the most preferred treatment as they not only rehabilitate the ability of mastication but also improve aesthetics thus boosting the physiological effect of the patient. Glossary of Prosthodontic Terms (GPT-9) **(**1**)** has defined dental implant as a prosthetic device made of alloplastic material implanted into the oral tissues beneath the mucosal and periosteal layer and within the bone to provide retention and support for a fixed or removable dental prosthesis; a substance that is placed into or on the jaw bone to support a fixed or removable dental prosthesis. The implant has a high success rate of 93% in the mandible and 88% in the maxilla. **(**2**)**.

Besides being so successful, failures do occur and loss of osseointegration, peri-implantitis is the main cause for them. The long-term success of implant treatment depends upon both the dental clinician and the patient. So proper case selection, adequate surgical preparation, a passive fit of prosthesis, regular follow up and proper health care i.e. maintenances are of utmost importance for the success of the treatment. **(**3**)**.

**Structure of Dental Implant (**4**):**

1. Implant fixture
2. Abutment
3. Prosthesis

**Implant fixture/Implant Body:** a component of implant that is surgically placed in the bone. It involves 3 parts:

- Body
- Crest module
- Collar

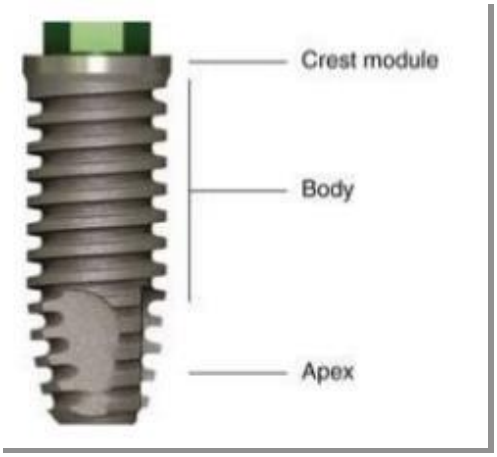


**Figure 1**: Parts of implant fixture

**Abutment (**5**):** It is a connecting link between fixture and prosthesis. It is of various types:

- **Internal connection-** internal hex, morse taper
- **External connection**- external hex, spine connection, external octagon.
- **Healing abutment-** conical shaped, bottle-shaped
- **UCLA** (Universal clearance limited abutment)-hex, nonhex This part

  is exposed to the oral cavity.

**Figure 2:** UCLA (Plastic sleeve)

**Prosthesis:** these can be retained both Cement Retained or Screw Retained **(**6**)**.


**Figure3:** cement and screw-retained prosthesis

**Classification of Dental Implants:**

There are three types of dental implants- Eposteal

dental implant

Endosteal dental implant

Transosteal dental implant

Dental implants have been classified under three categories **(**7**):**

- Depending upon the placement in the tissues
- Depending on the materials used
- Depending on their reaction with bone

**Depending on the Placement Within The Tissues**

| | |
|---|---|
| Endosteal | Root Form |
| | Blade Form |
| | Ramus Form |
| | |
| Subperiosteal | Unilateral |
| | Complete |
| | Circumferential |
| | |
| Transosteal | Single pin |
| | Multiple pin |

**Depending on the Materials used**

| | |
|---|---|
| Metallic | Stainless steel |
| | Commercially Pure Titanium (cp Ti) |
| | Titanium alloy |
| | |
| Non metallic | Zirconium |
| | Carbon |
| | |
| Polymers | PEEK |
| | Bio HPP |
| | PMMA |

**Depending on their reaction with bone**

- Biotolerant
- Bioactive
- Bioinert

## Indications

- The single edentulous area with healthy adjacent teeth
- Partial edentulism with the posterior edentulous tooth region
- Complete edentulous patients
- Patients who cannot tolerate a removable partial or complete denture.
- Patients who had high aesthetic demands
- Age above 18 years that is after growth is completed

## Contraindications

**Absolute contraindications**

- Heart diseases (Patient with history of less than 6 months) affecting the valves, recent infarcts, severe cardiac insufficiency, heart disease
- Active cancer, some bone diseases such as osteomalacia, Paget's disease, osteoporosis.
- Certain immunologic diseases, patient on immunosuppressive drug, AIDS
- Patient who had undergone a recent radiotherapy treatment
- Patient on bisphosphonates medication.

**Relative contraindications**

- Diabetes Type-2 **(**8**)**
- Pregnancy
- Smoking
- Hyperthyrodism

**Local contraindications**

- Some physiological changes within the oral cavity, might prevent the placement of dental implants.
- There is too little bone to support the implants to confirm an implant should be enclosed by healthy bone tissue.
- Important anatomical structures like the maxillary sinus, the inferior alveolar nerve, mental nerve have an abnormal position that may interfere with the dental implants.

## Basic Steps In Implant Placement (4,9)

**SURGICAL PHASE/STAGE -I**

- **Diagnosis and treatment planning** involves complete medical and dental history, soft tissue evaluation, intraoral examination, TMJ examination, palpation of Muscles of mastication.
- **Radiographic evaluation** to evaluate adequate bone height, bone width. This helps in selection of implant that is length and width of implant.
- **Preanaesthetic Medication** involves imitation of antibiotic, analgesics 24 hours before imitation of treatment and informed as well as written consent of the patient.
- **On the day of surgery:** evaluation of blood pressure, glucose level and complete sterilization of instruments.
- Depending upon clinicians one can decide to go for flapless or with incision and flap exposure.
- **Atraumatic** implant site preparation with adequate number of drills or instruments.
- **Copious** irrigation should be there to avoid overheating
- Implant should be placed on sound bone, and suture is placed.
- Follow up are done at interval of 24 hours, 3 days and 7 days
- After 7 days suture are removed and whether to go for immediate loading or delayed loading depend upon primary stability and clinician choice.
- It is best to **wait** for about 3 months for mandible and 3-6 months for maxilla implant to osseointegrate.
- Misch in 1996 states that Progressive loading is best loading protocol to be followed.

**STAGE –II**

- After about 3 -6 months, implant site are located.
- Implant are exposed, cover screw removed
- Implant stability are recorded
- Healing abutments are placed

**PROSTHETIC PHASE**

- Depending upon angulations of implant, abutments are decided i.e. straight or angulated.**(**10**)**
- Verification of abutment placement with radiograph.
- Impressions are made, impression coping i.e. open tray or closed depend upon angulation or number of implants.**(**11**)**
- Provisional restorations are given that can be either of resins or VLC material.
- Metal try-in, followed by bisque trail and later final restoration are inserted.
- Final restoration can be either cement retained or screw retained depends upon clinician's choice and intraoral conditions. **(**6**)**
- Post treatment instructions given to the patient to maintain oral hygiene.
- Regular follow ups are carried out.

## Osseointegration And Implant Stability **(**12,13**)**

Osseointegration is defined as a direct structural and functional connection between living bone and the surface of a load carrying implant. However, in certain cases such as in case with immediate loading, uncontrolled smoking and diabetes after implant placement leads to a fibrous connection known as Fibro-integration. It is an intervening fibrous connection between the loading surface of implant and bone.

Meffert et al. (1987) subdivided into:

- **Adaptive Osseointegration**: It is defined as a bone adjacent to implant surface without any intervening soft tissue under light microscope level.
- **Biointegration:** It is defined as a direct bone and implant surface attachment confirmed under electron microscopic level.
- **Osteogenesis:** The phenomenon of formation of bone on the surface of implant. It was given by Osborn and Newsley in 1980.

Osteogenesis are classified into two main categories:

- **Contact osteogenesis:** It includes a new bone formation, first on the implantsurface. The implant surface has to be surrounded by bone cells before the formation of bone matrix formation.
- **Distance osteogenesis:**It includes a new bone is formed on the surfaces just adjacent to the old bone at peri-implant site.

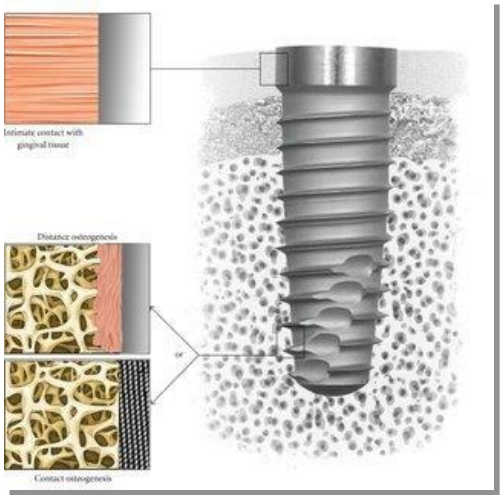


**Figure 4**: osteogenesis

## Implant Stability (14)

**The success of osseointegration criteria are as follow:**

**Schnitman And Schulman (15)**

1. Mobility in any direction less than 1 mm.
2. Radiologically observed no radiolucency.
3. Bone loss should not be greater than one-third of the vertical height of the bone.
4. Gingival inflammation should be absent, if present can be treated easily.
5. Functionally service of a prosthesis for not less than 5 years in 75% of patients.

**Alberktsson Success Criteria (1986) (**16**)**

1. An implant should be immobile when tested clinically.

2. The radiographic evaluation should not show any sign of radiolucency.

3. The bone loss around the fixtures should be less than 0.2 mm per year after the first year of implant loading.

4. The implant should not show any signs and symptoms of infection, pain, neuropathies, paresthesia.

5. An implant with a success rate of 85% at the end of 5 years and 80% at the end of 10 years.

**Implant Maintainces (**17**)**

A dental implant needs proper oral hygiene for the success of the treatment. These involve both professional as well as personal home care.

1. Professional care

- Sonic and ultrasonic scalers
- Plastic or Teflon coated curettes
- Oral irrigators

2.Personal home care

- Mechanical toothbrush
- Manual toothbrush
- Dental floss
- Water irrigators
- Mouthwash
- Interproximal brushes

## Conclusion

The more number of teeth is missing inpatient, the more challenging is the task to rehabilitate becomes. Successful implant treatment includes healthy and stable peri-implant conditions. Long term success of both periodontal and implant therapy depends on an efficient partnership between the patient and doctor. Proper case selection, implant placement and regular follow up mark the success of the treatment. No doubt, failures are stepping-stones to success but not until their etiologies are established and their occurrence can be prevented. However, with the introduction of Basal implants, placement of implants and rehabilitation has become possible within few days making implant treatment more effective and beneficial.

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